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JUN 20 2003
TC 1700

AMENDMENTS

MARKED-UP VERSION

In the Claims:

1. (Amended) A coating composition for application on an ink jet printed porous substrate for improving the waterfastness of the ink jet image comprising [a polymer] ethoxylated polyethyleneimine, a pH modifier, a thickening additive, an electrolyte, a surfactant, and water.

Cancel claim 2.

3. (Amended) A coating composition as claimed in claim [2] 1 wherein the ethoxylated polyethyleneimine comprises from about 0.5% to 10% by weight, based on a 100% weight basis.

Cancel claim 6.

7. (Amended) A coating composition as claimed in claim [6] 5 wherein the [Surfynol] surfactant is present in an amount of about 0.05% to 0.5% by weight.

8. (Amended) A coating composition as claimed in claim 7 wherein the [Surfynol] surfactant comprises 0.3% by weight.

Cancel claims 15 and 16.

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REMARKS

In the Office Action of October 8, 2002, the Examiner has stated that the oath/declaration must identify the post office address, including ZIP code designation, for each inventor. Attached hereto is a copy of the declaration filed in response to the notice To File Missing Parts, executed by the inventors and indicating the residence address of each inventor, customarily known as the post office address of each inventor. The residence post office address includes the ZIP code designation for each inventor.

The Examiner has rejected claims 1 and 5-10 under 35 USC 112, first paragraph, as being nonenabling for polymer other than ethoxylated polyethylenimine, and claims 6, 7, 15 and 16 under 35 USC 112, second paragraph, as being indefinite. Claims 1-3, 5, 13, 15, 18 and 20 are rejected under 35 USC §102(b) as being anticipated by Ooms. Claims 1-3, 5-7, 9, 13-18 and 20 are rejected under 35 USC 103(a) as being unpatentable over Botros '789 in view of either Gundlach et al or Moffatt et al. Claim 4 is rejected under 35 USC 103(a) as being unpatentable over Botros '789 in view of either Gundlach et al or Moffatt et al, and further in view of Bates et al. Claim 8 is rejected under 35 USC 103(a) as being unpatentable over Botros '789 in view of either Gundlach et al or Moffatt et al, and further in view of Kashiwazaki et al. Claims 10-12 are rejected under 35 USC 103(a) as being unpatentable over Botros '789 in view of either Gundlach et al or Moffatt et al, and further in view of Kashiwazaki et al and Kitamura et al. Claim 19 is rejected under 35 USC 103(a) as being unpatentable over Botros '789 in view of either Gundlach et al or Moffatt et al, and further in view of Hayes. Claims 1-7, 9-18 and 20 are rejected under 35 USC 103(a) as being unpatentable over Botros '512 in view of either Gundlach et al or Moffatt et al. Claim 8 is rejected under 35 USC 103(a) as being unpatentable over Botros '512 in view of either Gundlach et al or Moffatt et al, and further in view of Kashiwazaki et al. and Kitamura et al. Kashiwazaki et al. Claim 19 is

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rejected under 35 USC 103(a) as being unpatentable over Botros '512 in view of either Gundlach et al or Moffatt et al, and further in view of Hayes. Claims 1-5, 13, 15 and 18-20 are rejected under 35 USC 103(a) as being unpatentable over Miyazaki et al in view of Bates et al. Claims 6-8 is rejected under 35 USC 103(a) as being unpatentable over Miyazaki et al in view of Bates et al, and further in view of Kashiwazaki et al.

The Office Action of October 8, 2002, has been carefully considered and by this amendment, entry of which is respectfully requested, claims 1, 3-5, 7-14 and 17-20 remain in the application; claims 2, 6, 15 and 16 have been canceled; and claims 1, 3, 7 and 8 have been amended. The amendments do not add new matter.

A claim, in order to pass muster under 35 USC §112, second paragraph, need only be clear to one skilled in the art, when read in light of the specification, so as to permit one skilled in the art to define the metes and bounds of the invention. In re Goffe, 188 USPQ 131, 135 (CCPA 1975). Therefore, §112, second paragraph, only requires applicant to set forth with sufficient particularity the invention so as to permit one skilled in the art to define the metes and bounds of the invention.

All of the comments of the Examiner have been noted and addressed by amending or canceling claims. The remaining claims have been carefully reviewed to ensure conformance with 35 USC 112. Based on the amendments to the claims and the remarks herein, applicants submit that the remaining claims are in compliance with 35 USC §112.

Turning now to the rejection of claims 1-20 under 35 USC §102(b) and/or 35 USC §103(a), Applicants respectfully traverse these rejections for the reason that the cited art does not teach, anticipate, or render obvious the invention of Applicants, as now claimed.

The test for determining if a cited document anticipates a claim, for purposes of a rejection under 35 USC §102, is whether the cited document discloses all of

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the elements of the claimed combination, or the mechanical equivalents, functioning in substantially the same way to produce substantially the same results. As noted by the Court of Appeals of the Federal Circuit in Lindemann Maschinenfabrik GmbH v. American Hoist and Derrick, 221 USPQ 481, 485 (1984), in evaluating the sufficiency of an anticipation rejection under 35 USC §102:

"Anticipation requires the presence in a single prior art reference disclosure of each and every element of the claimed invention, arranged as in the claim."

Furthermore, it is noted in MPEP Section 706 that the standard of patentability to be followed in the examination of a patent application is that which was enunciated by the Supreme Court in Graham v. John Deere, 148 USPQ 459 (1966), where the Court stated:

"Under Section 103, the scope and the content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved."

In considering the Ooms patent cited by the Examiner, it is respectfully submitted that the Ooms fabric softener composition neither discloses each and every element of the claimed invention, nor recognizes and discloses the a coating composition for enhancing waterfastness. The subject invention now claims ethoxylated polyethyleneimine as a necessary component of the coating composition. While Ooms lists ethoxylated polyethyleneimine as an optional ingredient, its purpose is to provide valuable softening robustness and viscosity control (see col. 8, lines 64-68). In the subject application, EPI is the component which provides permanence to the image by reacting with the dye in the ink under a precisely controlled pH range.

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Another ingredient in the coating composition of the subject invention is an electrolyte, such as an ammonium sulfate. The Examiner contends that the Ditallow Dimethyl Ammonium Methyl Sulfate in Ooms, at col. 5 lines, 28-29, which was added in an amount of 13.5% to 20% (see col. 4, line 14), is an ammonium sulfate. However, the Ooms material is an insoluble quaternary ammonium salt with long chain C12 -C24 fatty acid, normally used as fabric softeners. An electrolyte such as ammonium sulfate in the subject application is critical in the coating composition. When the coating dries on paper, the ammonium sulfate lowers the pH enough to confer maximum cationic charge on the polymer to insure full interaction and fixation of the anionic dye in the ink to the paper. This is completely different from the material and purpose of the components in Ooms.

Although Ooms mentions pH buffers at col. 6, line 56, as an optional component, the pH range in the highly preferred composition (see col. 4, line 13) is from 3.5 to 7, and most preferably between 4 and 6 (see col. 4, line 28). The subject application specifies a pH modifier DMEA to maintain a precise pH range between 8.8 and 9.1 and it is explained why this is important and what happens if the pH is outside of those specified limits. Hence, the pH buffer mentioned, but not identified, in Ooms, is not even in the appropriate range for enhancing the waterfastness of a coating composition.

The Ooms patent discloses optical brighteners as an optional component at col. 6, line 56. This component is used in fabric treatment to mask yellowness of the fabric. In the subject application, the UV fluorescent dye is used to allow for visual inspection of the integrity of the coating layer under UV light.

In considering the Miyazaki patent, Miyazaki claims a pseudo-plastic aqueous ink for ball point pens. As defined at col. 3, lines 3-8, pseudo-plasticity means the ink is highly viscous (the consistency of ink in a ball point cartridge) and upon

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applying external force, viscosity decreases drastically to become fluid ink for writing. Such a drastic change in viscosity, besides being impractical for a coating fluid such as is described and claimed in the subject application, would be detrimental to the whole coating process to insure even coating. Furthermore, a major difference between Miyazaki and the subject invention is that Miyazaki used *anionic* polymers in his ink. Such polymers would be ineffective if used in the subject coating invention, since all of the dyes in the subject invention are anionic. Therefore, no interaction would take place between the dye and the polymer! As a result, permanency would suffer immensely.

The Examiner states that "it therefore would have been obvious to one of ordinary skill in the art to use ammonium salt in the ink of Miyazaki in order to produce waterfast ink, and thereby arrive at the claimed invention." It is respectfully submitted that the Examiner did not understand the role of ammonium sulfate in the current invention, and so did not realize that the addition of ammonium sulfate to the Miyazaki ink will do NOTHING to improve its waterfastness. The function of ammonium sulfate in the subject application is to lower the pH of the ink while it is drying on the substrate, therefore increasing the *cationic* charge on the *cationic* polymer to interact with the *anionic* dye to produce a waterfast image. If the polymer is anionic as in the Miyazaki disclosure, ammonium sulfate will not affect the polymer! Therefore, it clearly would *not* have been obvious or beneficial to use ammonium salt in the ink of Miyazaki in order to produce waterfast ink.

Turning now to the Botros patents cited by the Examiner, the Botros '789 patent disclosed the role of $(\text{NH}_4)_2 \text{SO}_4$ in the enhancement of waterfastness of relatively more water soluble dyes such as sulfur Black 2 when it is added in combination of EPI-polymer. However, the Examiner overlooked the strength of EPI used in the example cited. While it is true that the Botros '789 patent uses 8%, it is 8% of an 18% EPI which translates into 1.44% for 100%. Consequently, claim 9 in the '789 patent

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indicates 1-2% EPI, which is not nearly suitable for the purpose of the subject application.

The Botros '512 patent addressed the more challenging fixation of non-black color dyes. These dyes are much more soluble and would require much more EPI beyond suitability to run successfully in commercially available inkjet printers. The '512 patent disclosed the benefit of adding 1-8% NMP in combination of EPI and $(NH_4)_2 SO_4$. Again, the strength of EPI used in those examples was 18% and claim 3 of the '512 patent indicated 1% to 10% which translates into 0.18% to 1.8% on a 100% weight basis.

Although every effort was made to reduce the amount of EPI in the ink, the fact remains that polymeric inks run with much less reliability than non-polymeric inks due to pre-mature interaction between the dye and the polymer forming insoluble dye particles which may clog orifices and cause crooked jets. In addition, viscosity limitation of inkjet inks dictates the amounts of EPI that can safely be used in the ink. While enhancement of waterfastness by using $(NH_4)_2 SO_4$ and NMP in combination with EPI certainly helps, complete fixation of the most soluble dyes were still sought.

The present invention precisely addresses the need for achieving complete waterfastness of prints while maintaining optimum runnability of the ink in the printer, a need not solved for by any of the cited art, taken singularly or in combination. The polymer was separated from the dye and remained in the coating fluid. Therefore, enough EPI was added to fix the most soluble dyes completely, without interfering with runnability of the ink in the printer. The quantity of EPI used in the current invention far exceeds the amount of EPI disclosed in the Botros '789 and '512 patents. Claim 3 in the present application indicates an EPI range of 0.5% to 10% *based on* a 100% Weight basis, and claim 4 shows EPI at 5% on a 100% weight basis. This is a major difference between the present invention and the cited art, and particularly the Botros '789 and '512 patents.

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In her comments, the Examiner cited the amount of DMAE used to control pH for "good storage stability that does not corrode the printer." The fact is, a delicate balance between $(\text{NH}_4)_2\text{SO}_4$ and DMAE must exist to insure stability of EPI and degree of fixation of the dye. Adding more DMAE in the coating fluid inhibits fixation of the dye and adding less diminishes stability of EPI. On the other hand, adding more $(\text{NH}_4)_2\text{SO}_4$ diminishes the stability of EPI and adding less diminishes fixation of the dye. Therefore, a delicate balance between these two additives had to be found to insure maximum dye fixation. Such a delicate balance must be compatible with the chosen type of thickener. The current application showed several thickeners that could not be used, such as starch, algenic acid salts, polyvinyl alcohols (PVA) and carboxymethyl cellulose salts, due to various reasons described in the application. This is *contrary* to what was disclosed in the patents cited by the Examiner, wherein numerous thickeners were cited as suitable, and *no* thickeners were cited as unsuitable.

In considering the art cited by the Examiner, including Ooms, Botros '789, Gundlach et al, Moffatt et al, Bates et al, Kashiwazaki et al, Kitamura et al, Hayes, Botros '512, and Miyazaki et al, when taken singularly or in any combination, the present invention differs from the prior art in several major respects. First, complete dye fixation to the most soluble dyes in the ink is only achieved with the composition of the present invention. Second, versatility in achieving maximum waterfastness independent of the ink in the printer and the substrate used is only achieved with the composition of the present invention. Third, only the composition of the present invention insures maximum reliability in the printer running simple non-polymeric inks. Fourth, only the coating fluid composition of the present invention can achieve a substantial increase in optical density of the print. It is respectfully submitted, therefore, that independent claim 1 of the present invention cannot be anticipated or obviated by the cited art.

Claims 3-5, 7-14 and 17-20 depend from independent claim 1 to

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contain all of the limitations found therein. By this dependency, it is submitted that these claims are not anticipated, taught, or rendered obvious by the cited art for the reasons discussed above. It is respectfully submitted that all of the remaining claims of this application are therefore clearly allowable, which allowance is respectfully requested.

Applicants' attorney has reviewed the additional art cited by but not relied upon by the Examiner. That document does not teach, anticipate, or render obvious, when taken singularly or in combination, the invention of applicants disclosed in the subject application.

In view of the foregoing remarks, the undersigned attorney respectfully submits that all of the claims of the application are clearly allowable. Therefore, Applicant's attorney respectfully requests that the Examiner's objections and rejections be withdrawn and that a formal Notice of Allowance be issued thereon.

If it is believed that an interview would serve to facilitate prosecution of the present application, the Examiner is requested to contact the undersigned attorney. Should the Examiner have any questions with respect to any matter now of record, Applicants' attorney may be reached at (937) 592-8603.

Respectfully submitted,

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April 7, 2003